



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/685,983	10/15/2003	Yuriy Zakharov	G&C 184.2-US-11	7100
22462	7590	10/10/2007	EXAMINER	
GATES & COOPER LLP HOWARD HUGHES CENTER 6701 CENTER DRIVE WEST, SUITE 1050 LOS ANGELES, CA 90045			DO, CHAT C	
			ART UNIT	PAPER NUMBER
			2193	
			MAIL DATE	DELIVERY MODE
			10/10/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/685,983

Applicant(s)

YURIY ZAKHAROV

Examiner

Chat C. Do

Art Unit

2193

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 August 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-73 and 75-80 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-73 and 75-80 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. This communication is responsive to Amendment filed 08/13/2007.
2. Claims 1-73 and 75-80 are pending in this application. Claims 1, 37, 39, 72, 75, and 80 are independent claims. In Amendment, claims 74 and 81-122 are cancelled. This Office Action is made final.

#### *Claim Rejections - 35 USC § 101*

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.
4. Claims 1-73 and 75-80 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1-73 and 75-80 cite a method and apparatus for solving a system of N linear equations in accordance with a mathematical algorithm. In order for claims to be statutory, claims must either include a practical/physical application or a concrete, useful, and tangible result. However, claims 1-73 and 75-80 merely disclose steps/components for solving a system of N linear equations without further disclosing a practical/physical application or a useful and tangible result since the claims appear to preempt every substantial practical application of the idea embodied by the claim and there is no cited limitation in the claims that breathes sufficient life and meaning into the preamble so as to limit it to a particular practical application rather than being so broad and sweeping as

to cover every substantial practical application of the idea embodied therein. In addition, claims 38 and 73 are software per se embodied in a non-tangible medium as a data carrier. Therefore, claims 1-73 and 75-80 are directed to non-statutory subject matter.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-11, 27-32, 34-47, 63-67, 69-73, and 75-80 are rejected under 35 U.S.C. 102(b) as being anticipated by Yu et al. ("New Recursive Algorithm for Solving Linear Algebraic Equations").

Re claim 1, Yu et al. disclose a method for solving a system of N linear equations in N unknown variables (e.g. expression 1 in page 2069 wherein x is the unknown vector of variables), the method comprising: (a) storing an estimate value for each unknown variable (e.g. for performing in computer system and right column page 2070); (b) initialising each estimate value to a predetermined value (e.g. right column in page 2069 and the new recursive algorithm in right column page 2070 wherein the initial value is  $x_0$ ); (c) for each estimate value: (i) determining whether a respective predetermined condition is satisfied (e.g. from expression 8 to expression 11 in page 2070); and (ii) updating the estimate if and only if the respective predetermined condition is satisfied (e.g. step 2 in right column in page 2070); and (d) repeating step (c) a plurality of times (e.g. repeat the

steps above for  $i = 1$  to  $n$  as seen in page 2070); and outputting the estimate values to provide an estimate of a solution to said system of linear equations (e.g. output of final  $x$  vector values in expression 2 of the algorithm in right column in page 2070).

Re claim 2, Yu et al. further disclose updating comprises adding a scalar value  $d$  to the respective estimate value, or subtracting a scalar value  $d$  from the respective estimate value (e.g. step 2 in right column in page 2070 wherein the right most term is the scalar value  $d$ ).

Re claim 3, Yu et al. further disclose scalar value  $d$  is updated in a predetermined manner (e.g. accordingly to the new recursive algorithm as seen in page 2070).

Re claim 4, Yu et al. further disclose scalar value  $d$  is updated when and only when step (c) updates no estimate values (e.g. limited feedback loop in right column in page 2070).

Re claim 5, Yu et al. further disclose updating divides  $d$  by a scalar update value (e.g.  $z/z*z$  in right column page 2070).

Re claim 6, Yu et al. further disclose the scalar update value is equal to a power of two (e.g. by  $a_i$  of matrix  $A$ ).

Re claim 7, Yu et al. further disclose the scalar update value is equal to two (e.g. by  $a_i$  of matrix  $A$ ).

Re claim 8, Yu et al. further disclose each of estimate values is initialised to be equal to zero (e.g.  $x_0$  is arbitrary).

Re claim 9, Yu et al. further disclose the respective predetermined condition for each respective estimate value does not involve the respective estimate value (e.g. expression 8 to the right column in page 2070 as the final solution is reached).

Re claim 10, Yu et al. further disclose the method establishes a respective auxiliary value for each estimate value (e.g.  $P_i$  corresponding to  $x_i$ ).

Re claim 11, Yu et al. further disclose auxiliary values form an auxiliary vector  $Q$  (e.g.  $P_i$  corresponding to  $x_i$ ).

Re claim 27, Yu et al. further disclose each estimate value is represented as a fixed point binary word (e.g. right column in page 2069).

Re claim 28, Yu et al. further disclose each estimate value is a floating point binary word (e.g. right column in page 2069).

Re claim 29, Yu et al. further disclose each estimate value is a complex number (e.g. right column in page 2069).

Re claim 30, Yu et al. further disclose the scalar value  $d$  is updated such that the algorithm updates the estimate values in a bitwise manner, beginning with the most significant bit (e.g. steps 1-3 in right column in page 2070).

Re claim 31, Yu et al. further disclose step (d) is carried out until a predetermined condition is satisfied (e.g. end of the loop).

Re claim 32, Yu et al. further disclose predetermined condition is a maximum number of iterations without an update to the scalar value  $d$  (e.g. looping for  $n$  times in page 2070).

Re claim 34, Yu et al. further disclose the accurate solution of the equations is known to lie between upper and lower bounds, and the algorithm seeks a solution between upper and lower bounds (e.g. inherently for any number).

Re claim 35, Yu et al. further disclose estimate values are initialised to a value which is within upper and lower bounds (e.g. inherently for any number).

Re claim 36, Yu et al. further disclose estimate values are initialised to a value positioned at the midpoint of upper and lower bounds (e.g.  $x_0$  is set to be at 0).

Re claim 37, it is an apparatus claim of claim 1. Thus, claim 37 is also rejected under the same rationale as cited in the rejection of rejected claim 1.

Re claim 38, it is a data carrier claim of claim 1. Thus, claim 38 is also rejected under the same rationale as cited in the rejection of rejected claim 1.

Re claim 39, it has similar limitations cited in claim 4. Thus, claim 39 is also rejected under the same rationale as cited in the rejection of rejected claim 4.

Re claim 40, it has similar limitations cited in claim 2. Thus, claim 40 is also rejected under the same rationale as cited in the rejection of rejected claim 2.

Re claim 41, it has similar limitations cited in claim 5. Thus, claim 41 is also rejected under the same rationale as cited in the rejection of rejected claim 5.

Re claim 42, it has similar limitations cited in claim 6. Thus, claim 42 is also rejected under the same rationale as cited in the rejection of rejected claim 6.

Re claim 43, it has similar limitations cited in claim 7. Thus, claim 43 is also rejected under the same rationale as cited in the rejection of rejected claim 7.

Re claim 44, it has similar limitations cited in claim 8. Thus, claim 44 is also rejected under the same rationale as cited in the rejection of rejected claim 8.

Re claim 45, it has similar limitations cited in claim 4. Thus, claim 45 is also rejected under the same rationale as cited in the rejection of rejected claim 4.

Re claim 46, it has similar limitations cited in claim 10. Thus, claim 46 is also rejected under the same rationale as cited in the rejection of rejected claim 10.

Re claim 47, it has similar limitations cited in claim 11. Thus, claim 47 is also rejected under the same rationale as cited in the rejection of rejected claim 11.

Re claim 63, it has similar limitations cited in claim 27. Thus, claim 63 is also rejected under the same rationale as cited in the rejection of rejected claim 27.

Re claim 64, it has similar limitations cited in claim 28. Thus, claim 64 is also rejected under the same rationale as cited in the rejection of rejected claim 28.

Re claim 65, it has similar limitations cited in claim 29. Thus, claim 65 is also rejected under the same rationale as cited in the rejection of rejected claim 29.

Re claim 66, it has similar limitations cited in claim 31. Thus, claim 66 is also rejected under the same rationale as cited in the rejection of rejected claim 31.

Re claim 67, it has similar limitations cited in claim 32. Thus, claim 67 is also rejected under the same rationale as cited in the rejection of rejected claim 32.

Re claim 69, it has similar limitations cited in claim 34. Thus, claim 69 is also rejected under the same rationale as cited in the rejection of rejected claim 34.

Re claim 70, it has similar limitations cited in claim 35. Thus, claim 70 is also rejected under the same rationale as cited in the rejection of rejected claim 35.



Re claim 71, it has similar limitations cited in claim 36. Thus, claim 71 is also rejected under the same rationale as cited in the rejection of rejected claim 36.

Re claim 72, it is an apparatus claim of claim 39. Thus, claim 72 is also rejected under the same rationale as cited in the rejection of rejected claim 39.

Re claim 73, it is a data carrier claim of claim 39. Thus, claim 73 is also rejected under the same rationale as cited in the rejection of rejected claim 39.

Re claim 75, it is a computer processor claim of claim 1. Thus, claim 75 is also rejected under the same rationale as cited in the rejection of rejected claim 1.

Re claim 76, it is a computer processor claim of claim 2. Thus, claim 76 is also rejected under the same rationale as cited in the rejection of rejected claim 2.

Re claim 77, it is a computer processor claim of claim 6. Thus, claim 77 is also rejected under the same rationale as cited in the rejection of rejected claim 6.

Re claim 78, it is a computer processor claim of claim 7. Thus, claim 78 is also rejected under the same rationale as cited in the rejection of rejected claim 7.

Re claim 79, it has similar limitations cited in claim 3. Thus, claim 79 is also rejected under the same rationale as cited in the rejection of rejected claim 3.

Re claim 80, it is a computer processor claim of claim 1. Thus, claim 80 is also rejected under the same rationale as cited in the rejection of rejected claim 1.

### ***Response to Arguments***

7. Applicant's arguments filed 08/13/2007 have been fully considered but they are not persuasive.

a. The applicant argues in page 17 first three paragraphs for claims rejected under 35 U.S.C. 101 that the claimed system of linear equations occurs frequently in many branches of science and engineering as indicated in the specification. Thus, the output from an analysis of a set of linear equations provides a concrete, useful, and tangible result as required under 35 U.S.C. 101.

The examiner respectfully submits that the claims, themselves, are purely mathematical operations or algorithm which does not have any practical application of having the specific system of solving the N linear equations. The rejection of claims under 35 U.S.C. 101 is based on the claims' subject matter.

b. The applicant argues in page 18 first two paragraphs for claims rejected under 35 U.S.C. 102(b) that the cited reference by Yu does not disclose the limitation "for each estimate value; determining whether a respective predetermined condition is satisfied and updating the estimate if and only if the respective predetermined condition is satisfied".

The examiner respectfully submits that the current claim language does not specifically define or address what is the predetermined condition. Thus, ANY condition is utilized or applied in the algorithm would meet the claim language. As clearly seen in the cited reference by Yu, particularly the new recursive algorithm in right column page 2070, the i variable as index must equal to specific number assigned 1...n in order to update the estimated value x. Otherwise, it will exits the loop without any updating the estimated value x.

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chat C. Do whose telephone number is (571) 272-3721. The examiner can normally be reached on M => F from 7:00 AM to 5:30 PM.

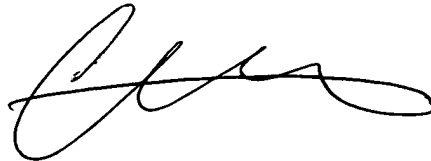
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2193

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chat C. Do  
Examiner  
Art Unit 2193

October 3, 2007

A handwritten signature in black ink, appearing to be 'Chat C. Do', written in a cursive style.